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SUSTAINABILITY IN PROTEIN EXTRACTION: FROM SOURCE TO TECHNOLOGY – A CASE STUDY OF FABA BEAN PROTEIN

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Sustainability in protein extraction can be achieved either by using sustainable protein sources - such as waste materials, abundant or orphan crops, or bio-renewable resources - or through the application of green extraction techniques, process optimization in terms of resource usage and energy consumption and a biorefinery approach. This study explores sustainability in protein extraction by comparing three isolation techniques for extracting protein from faba bean, an orphan crop. The methods examined include alkaline extraction followed by isoelectric precipitation, NaCl extraction (micellization), and the use of deep eutectic solvents (DES), specifically choline chloride/urea and choline chloride/glycerol. The NaCl technique was found to best preserve the protein's natural state, while the DES method resulted in higher protein solubility, particularly near the isoelectric point, and improved foaming capacity and stability. Isoelectric precipitation yielded high water retention and oil absorption capacities. Despite all techniques producing high-purity proteins, the DES approach showed a lower yield, suggesting the need for optimization in terms of solvent water content and precipitation methods. The study highlights how different extraction techniques influence the functional properties of faba bean protein, offering insights into sustainable protein processing through innovative methods and resource efficiency.

Keywords: faba bean, protein extraction, green solvents, sustainability

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